

South Carolina Department of Health and Environmental Control

ENVIRONMENTAL AFFAIRS

SHELLFISH MANAGEMENT AREA 10A

2020 ANNUAL UPDATE

**Shellfish Sanitation Section
Environmental Affairs
2600 Bull Street
Columbia, SC 29201**

December 2020



WEB ADDRESS
<http://www.scdhec.gov/FoodSafety/ShellfishMonitoring/>

SHELLFISH MANAGEMENT AREA 10A 2020 ANNUAL UPDATE

[Data Through December 2019]



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2020 ANNUAL UPDATE
Shellfish Management Area 10A

Data Inclusive Dates:

01/01/17 thru 12/31/19

Classification Change:

 X Yes No

Shoreline Survey Completed: Yes

Prior Report & Date: 2019 Annual Update

(I)ncreased/(D)ecreased/(N)one:

 D Approved
 N Conditionally Approved
 I Restricted
 N Prohibited

SUMMARY

Shellfish Management Area 10A (SFMA 10A) is greatly influenced by precipitation runoff. There is only one classification change recommended to be implemented for the 2020-2021 shellfish harvesting season. Station 10A-16B (Clark Sound, 550 yds East of Station 10A-16A) failed to meet an Approved Classification and is now classified Restricted.

During the past several years major storms have impacted SFMA 10A. In September of 2019, Hurricane Dorian produced 6.92 inches of rainfall during a two-day period. In October of 2016, heavy rains and wind associated with Hurricane Matthew impacted the area. Area 10A received excessive amounts of rain during the storm event which required a precautionary closure and subsequent sampling to reopen the area. Area 10A was again impacted the following year on September 12, 2017 from heavy rains and wind associated with Hurricane Irma. Area 10A received 6.34 inches of rain during the storm event, which resulted in a delayed opening of the 2017 Shellfish Season and special sampling to be conducted prior to the opening of the area.

On February 27, 2018, Charleston Harbor south to the North Edisto River including all areas of Area 10A were closed due to a force main break in the Town of Hollywood's sewer line. Those areas were reopened on March 20, 2018.

INTRODUCTION

PURPOSE AND SCOPE

The authority to regulate the harvest, sanitation, processing, and handling of shellfish is granted to the South Carolina Department of Health and Environmental Control by Section 44-1-140 of the Code of Laws of South Carolina, 1976, as amended. The Department promulgated Regulation 61-47, which provides the rules used to implement this authority and outlines the requirements applied in regulating shellfish sanitation in the State. This regulation specifically addresses classification of shellfish harvesting areas and requires that all areas be examined by sanitary and bacteriological surveys and classified into an appropriate shellfish harvesting classification.

The United States Food and Drug Administration (USFDA) uses The National Shellfish Sanitation Program's (NSSP) *Guide for the Control of Molluscan Shellfish* to evaluate state shellfish sanitation programs. The NSSP Model Ordinance requires that a sanitary survey be in place for each growing area prior to its use as a source of shellfish for human consumption and prior to the area's classification as Approved, Conditionally Approved, Restricted, or Conditionally Restricted. Each sanitary survey shall be updated on an annual basis and accurately reflect changes which have occurred within the area. Requirement of the annual reevaluation include, at a minimum, field observations of pollution sources, an analysis of water quality data consisting of the past year's data in combination with appropriate previously collected data, review of reports and effluent samples from pollution sources, and review of performance standards for discharges impacting the growing area. A brief report documenting the findings shall also be provided.

The following criteria consistent with the NSSP Model Ordinance and S. C. Regulation 61-47 are used in establishing shellfish harvesting classifications:

Approved Area - Growing areas shall be classified approved when the sanitary survey concludes that fecal material, pathogenic microorganisms, and poisonous or deleterious substances are not present in concentrations that would render shellfish unsafe for human consumption. Approved classifications shall be determined upon a sanitary survey that includes water samples collected from stations in the designated area adjacent to actual or potential sources of pollution. For waters sampled under adverse pollution conditions, the median fecal coliform Most Probable Number (MPN) or the geometric mean MPN shall not exceed fourteen per one hundred milliliters, nor shall more than ten percent of the samples exceed a fecal coliform MPN of forty-three per one hundred milliliters (per five tube decimal dilution). For waters sampled under a systematic random sampling plan, the geometric mean fecal coliform MPN shall not exceed fourteen per one hundred milliliters, nor shall the estimated ninetieth percentile exceed an MPN of forty three per one hundred milliliters (per five tube decimal dilution). Computation of the estimated ninetieth percentile shall be determined using National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish methodology.

Conditionally Approved Area - Growing areas may be classified conditionally approved when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in non-point source pollution from rainfall runoff or discharge of a major river, a management plan describing conditions under which harvesting will be allowed shall be adopted by the Department prior to classifying an area as conditionally approved. Where appropriate, the management plan for each conditionally approved area shall include performance standards for sources of controllable pollution (e.g., wastewater treatment and collection systems), evaluation of each source of pollution, and means of rapidly closing and subsequently reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate. Shellfish shall not be directly marketed from a conditionally approved area until conditions for an approved classification have been met for a period of time likely to ensure the shellfish are safe for consumption. Shellstock from conditionally approved areas that have been subjected to temporary conditions of actual or potential pollution may be relayed to approved areas for purification or depurated through controlled purification operations only by special permit

issued by the Department.

Restricted Area - Growing areas shall be classified restricted when sanitary survey data show a moderate degree of pollution or the presence of deleterious or poisonous substances to a degree that may cause the water quality to fluctuate unpredictably or at such a frequency that a conditionally approved classification is not feasible. Shellfish may be harvested from areas classified as restricted only for the purposes of relaying or depuration and only by special permit issued by the Department and under Department supervision. The suitability of restricted areas for harvesting of shellstock for relay or depuration purposes may be determined through the use of comparison studies of background tissue samples with post-process tissue samples, as well as other process verification techniques deemed appropriate by the Department. For restricted areas to be utilized as a source of shellstock for depuration, or as source water for depuration, the fecal coliform geometric mean MPN of restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters nor shall more than ten percent of the samples exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters nor shall the estimated ninetieth percentile exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish methodology.

Conditionally Restricted Area - Growing areas may be classified conditionally restricted when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be prepared by the Department prior to classifying an area as conditionally restricted. Where appropriate, the management plan for each conditionally restricted area shall include performance standards for sources of controllable pollution, e.g., wastewater treatment and collection systems and an evaluation of each source of pollution, and description of the means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate. Shellfish may be harvested from areas classified as conditionally restricted only for the purposes of relaying or depuration and only by permit issued by the Department and under Department supervision. For conditionally restricted areas to be utilized as a source of shellstock for depuration, the fecal coliform geometric mean MPN of conditionally restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters nor shall more than ten percent of the samples exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters nor shall the estimated ninetieth percentile exceed an MPN of two hundred and sixty per one hundred milliliters (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish methodology.

Prohibited Area - Growing areas shall be classified prohibited if there is no current sanitary survey report or if the sanitary survey report or monitoring data show unsafe levels of fecal material, pathogenic microorganisms, or poisonous or deleterious substances in the growing area or otherwise indicate that such substances could potentially reach quantities that could render shellfish unfit or unsafe for human consumption.

BACKGROUND INFORMATION

This sanitary survey evaluates the current harvesting classification of shellfish growing waters designated as Shellfish Management Area 10A (SFMA 10A). Area 10A consists of approximately 15,191 acres of shellfish growing area habitat located in Charleston County, South Carolina. Area 10A extends in a northeasterly to southwesterly direction from the Charleston Harbor to the Stono River. The major water bodies in Area 10A include Folly River, Lighthouse Creek, Schooner Creek and Clark Sound. The area is bordered to the northeast by the geographic boundaries of Clark Sound and Parrot Point Creek. An imaginary line from the confluence of the Folly River and the Stono River, northeastward through King Flats, to a point adjacent to Fludd's Creek, at the northwest corner of Clark Sound, defines the area's western boundary. The southern and eastern boundaries consist of the Atlantic Ocean shoreline of Folly and Morris Islands respectively.

The shellfish industry in South Carolina is based primarily on the harvest of the eastern oyster (*Crassostrea virginica*) and hard clams, which include both the northern clam (*Mercenaria mercenaria*) and several small populations of the southern clam (*Mercenaria campechiensis*). The ribbed mussel (*Geukensia demissa*) is also harvested in South Carolina, primarily gathered on a small scale by the general public for recreational harvest. Areas in South Carolina designated for commercial harvest by the South Carolina Department of Natural Resources (SCDNR) include State shellfish grounds, Culture permits, Mariculture permits and Kings Grant areas. The South Carolina Department of Health and Environmental Control disallows the harvesting of shellfish for direct marketing purposes from restricted waters. Shellfish harvesting from Prohibited waters for human consumption is not allowed.

There are seven (7) State Shellfish Grounds (S) within Area 10A: S189, S196, S201, S203, S205, S206 East, and S206 West. There is one (1) Recreational Shellfish Ground (R), R201, and no Kings Grants (G) located in Area 10A. There are ten (10) Culture Permits (C) and three (3) Mariculture Permit (M) leases located throughout Area 10A.

The wild-stock shellfish harvesting season in South Carolina extends from October through May of the following year. The SCDNR has the authority to alter the shellfish-harvesting season for resource management purposes and grant permits for year-round mariculture operations. Additionally, the South Carolina Department of Health and Environmental Control has the authority to prohibit shellfish harvesting when necessary to ensure that shellfish harvested in South Carolina waters are safe for human consumption.

The harvesting classifications of Area 10A **prior** to this sanitary survey were as follows:

PROHIBITED

1. Those waters and adjacent marshland between 10A-18 from Schooner Creek to the Charleston Harbor;
2. Those waters and adjacent marshland from Bass Creek to the Charleston Harbor;
3. Those waters and adjacent marshland within Parrot Point Creek from Lighthouse Rd down to Schooner Creek and across to the Charleston Harbor;
4. Those waters within 1,000 feet of the old Backman's Commercial Fisheries Dock;
5. Those waters within 1,000 feet of Sunset Cay Marina;
6. Those waters within 1,210 feet of Mariner's Cay Marina;
7. Those waters within 350 feet of Crosby's Commercial Fisheries Dock.

RESTRICTED

1. Those waters and adjacent marshland from Holland Island Creek to Folly Rd (171).

CONDITIONALLY APPROVED

None

APPROVED

1. Those waters of Clark Sound and surrounding marshlands from the headwaters of Schooner Creek to a line drawn between 10A-35, 10A-33, and 10A-34A;
2. All other waters in Area 10A.

Station Additions/Deactivations/Modifications: None

POLLUTION SOURCE SURVEY

SURVEY PROCEDURES

Shoreline surveys of Area 10A are conducted by the South Carolina Department of Health and Environmental Controls, Environmental Affairs, Lowcountry – Charleston Shellfish Sanitation Program staff, by watercraft, vehicle, and on foot, during the survey period and are ongoing. Extensive visual examinations of lands adjacent to the waters of Area 10A are conducted to determine potential sources of pollution entering shellfish growing waters.

POINT SOURCE POLLUTION

A. Municipal and Community Waste Treatment Facilities

National Pollutant Discharge Elimination System (NPDES) Permitted Facilities			
Permit #	Facility	Outfalls	Permitted Flow (Gallons Per Day)

SC0021229	Chas. Water Systems –Plum Island WWTP	001 – Ashley River	34,797,801 GPD
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There are no permitted wastewater treatment plants (WWTP) within Area 10A. The James Island Public Service District (PSD) and Charleston Water Systems collection systems together service nearly all of James Island. Public sewer also serves a small portion of Folly Beach as well. The Plum Island WWTP (SC0021229), operated by Charleston Water Systems, receives wastewater from James Island and Folly Beach; however, Plum Island is located on the Ashley River adjacent to Dill Creek, and discharges treated wastewater into the Charleston Harbor (Area 10B). The table below summarizes all instances where WWTP facilities exceeded their allowed permit values for enterococci, the Discharge Monitoring Report (DMR) value of that violation, and flow value. For the 2017-2019 reporting years for this Annual Update, Plum Island WWTP had three instances of permit violations for enterococci parameters.

WWTP Discharge Monitoring Report Violations 2017-2019					
Facility	Limit	Violation	Outfall	Report Date	Monthly Avg. Flow (Gallons Per Day)
Chas. Water Systems –Plum Island WWTP	501 Entero/100 ml	>2420 Entero/100ml	001	January 2019	28 MGD
	501 Entero/100 ml	1011 Entero/100ml	001	March 2019	21 MGD
	501 Entero/100 ml	>2420 Entero/100ml	001	June 2019	22 MGD

James Island (James Island PSD and Charleston Water Systems), reported forty-two (42) sanitary sewer overflow (SSO's) for 2017-2019. Folly Beach had no reported SSO's for 2017-2019.

Sanitary Sewer Overflows – 2017-2019				
James Island/Charleston Water Systems				
Date	Location	Gallons Released	Waterbody Entered	Growing Area
4/27/2017	Stono Watch Drive	1,500	Marsh Of Stono River	11
6/10/2017	40 Boardman Rd.	1,200	Orangegroove Creek To Ashley River	10B
7/12/2017	2265 Clement Ferry	3,450	Storm Drain	9B
7/24/2017	Lyttleton & Nicholson	6,000	Wappoo Cut	11
7/24/2017	1575 Dowden Ct.	2,400	Oldtown Creek To Ashley River	10B
8/3/2017	55 Beverly Drive	360	Greenway To Ashley River	10B
8/3/2017	Lyttleton & Nicholson	4,800	Wappoo Cut To Ashley River	10B
12/16/2017	Riverland Dr. & Camp Rd.	5,100	James Island Creek	11/10B
5/1/2018	Arv G-01 Located At A Creek Crossing Along West Ashley Greenway Near Archdale Drive	5	Small Tidal Creek Leading To Stono River	11
7/20/2018	2 Oakdale Place- West Ashley	Unknown	Marsh Landing To The Ashley River	10B
7/20/2018	1127 Donahue Dr - West Ashley	Unknown	Sw Pond To Marsh To Ashley River	10B
7/20/2018	1571 Dowden Court - West Ashley	Unknown	Ditch To The Marsh Then To The Ashley River	10B
7/20/2018	2 Lyttleton Ave - West Ashley	Unknown	Marsh To Wappoo. Cut To Ashley River	10B
7/20/2018	790 Woodard Rd - West Ashley	Unknown	Marsh Leading To Ashley River	10B
7/20/2018	49 & 55 Beverly Rd - West Ashley	3,600	Possibly To The Ashley River	10B
7/24/2018	Manhole Near Intersection Of Lyttleton And Nicholson - West Ashley	6,000	Marsh Leading To Wappoo Court To Ashley River	10B
7/25/2018	1575 Dowden Court- West Ashley	2,400	Discharge To Ditch Leading To Marsh Of Ashley River	10B
7/30/2018	1127 Donahue Dr - West Ashley	5,400	Stormwater Pond To Marsh Ashley River	10B
9/9/2018	1781 Harmony St West Ashley	8,400	N/A	10B
10/11/2018	Lyttleton Ave At Nicholson St West Ashley	13,200	Marsh Leading To Wappoo Cut To Ashley River	10B

10/11/2018	Hwy 61 & Hwy 17 Pump By Round Holiday Inn	500	Ashley River Via Strom Drain	10B
10/11/2018	William Ackerman Lane At Charkestowne Rd West Ashley	6,600	Marsh Leading To Wappoo Cut To Ashley River	10B
12/9/2018	137 Donahue Dr	1,800	Sw Pond To Marsh To Ashley River	10B
12/9/2018	Lyttleton At Nicholson	21,600	Marsh To Wappoo Cut To Ashley River	10B
12/9/2018	55 Beverly Rd	3,600	Possibly To The Ashley River	10B
12/9/2018	598 A Windemer Rd	7,200	N/A	10B
12/10/2018	501 Stinson Sr	1,500	N/A	10B
12/14/2018	55 Beverly Rd West Ashley	4,500	Possibly To The Ashley River	10B
12/14/2018	1127 Donahue Dr West Ashley	Unknown	Storm Water Pond To Marsh To Ashley River	10B
12/14/2018	Lyttleton Ave At Nicholson St West Ashley	Unknown	Marsh Leading To Wapoo Cut To The Ashley River	10B
12/14/2018	South Windemere Rd At William Ackerman Lane West Ashley	10,800	Marsh Leading To Wapoo Cut To The Ashley River	10B
7/8/2019	2235 Ashley River Rd near Ashley Crossing Ln – West Ashley	1,000	N/A	10B
8/14/2019	2169 Harborview Rd, James Island		Marsh near James Island Creek	10B
11/17/2019	Lyttleton Ave – West Ashley	2,400	N/A	10B
11/17/2019	South Windermere Rd at William Ackerman Ln- West Ashley	15,000	N/A	10B
11/19/2019	Marsh near the intersection of I-526 West and Clements Ferry Rd	3,500	Marsh adjacent to Cooper River	10B
12/23/2019	Charleston CPW Plum Island – Manhole 39- 247	2,460	N/A	10B
12/23/2019	Charleston CPW Plum Island – Manhole X-01	4,050	N/A	10B
12/23/2019	Charleston CPW Plum Island – Manhole 39	4,440	N/A	10B
12/24/2019	Charleston CPW Plum Island – Manhole 11- 01	2,910	N/A	10B
12/24/2019	Charleston CPW Plum Island - Manhole L1 04	4,500	N/A	10B

12/24/2019	Charleston CPW Plum Island – Manhole CC-22	2,100	N/A	10B
Folly Beach				
N/A	N/A	N/A	N/A	None reported

Available hydrographic information suggests the potential of an impact from pollution sources located outside the growing area. The portion of the area from the Charleston Harbor extending southwest to Schooner Creek appears to be adversely impacted during certain hydrographic conditions by waters originating in the Charleston Harbor (Moore, 1984).

Outfalls from wastewater treatment plants discharging into the harbor are subsequently discharging into northeastern portions of Area 10A. Flow calculations have established time and distance of travel and place the effluent plumes within Schooner Bay near Fort Sumter. Due to public health concerns, waters from the confluence of Schooner Creek and Schooner Bay and all associated creeks and marshland to Charleston Harbor will remain Administratively Prohibited.

B. Industrial Waste (Discharges) – There are currently no permitted active industrial waste discharges into the waters of Area 10A.

C. Marinas - In 2007, prompted by a SCDHEC Office of Coastal Resource Management (OCRM) marina definition change, SCDHEC Shellfish adopted the following marina definition. S.C. Regulation 61-47, Shellfish defines *Marina* as any of the following: 1) locked harbor facility; 2) any facility which provides fueling, pump-out, maintenance or repair services (regardless of length); or, 3) any facility which has permanent docking space of 250 linear feet or greater. 4) Any water area with a structure which is used for docking or otherwise mooring vessels and constructed to provide temporary or permanent docking space for more than ten boats. 5) A dry stack facility. SCDHEC is currently in the process of identifying all facilities meeting the new marina definition. Once identified, they will be mapped and adequate closure zones established to protect public health.

Prior to the 2007 definition change, there were two recreational marinas located within Area 10A. Mariner's Cay Marina is located on the Folly River adjacent to Folly Road. Mariner's Cay has 87 wet slips, approximately 60% of which are currently occupied, and offers fueling and wastewater pump-out services. Sunset Cay Marina (formerly Folly Marina) is located on the Folly River approximately one mile southwest of Mariner's Cay. Sunset Cay Marina has 118 wet slips, approximately 50% of which are currently occupied, and offers wastewater pump-out services. Additionally, two commercial fisheries facilities were located within Area 10A. Backman's Seafood operates a dock located in Backman's creek, north of Bowen's Island. Backman's Seafood has approximately 150 ft. to 200 ft. of dockage and accommodates between 1 and 2 shrimp trawlers. It has aboveground diesel fuel tanks, but the tanks are currently empty. Crosby's Fish and Shrimp Company operates a dock located in Folly Creek adjacent to Folly Road. Crosby's has approximately 300 ft. of dockage and typically accommodates 2 shrimp trawlers and 2 fishing vessels. There is no on-site fuel; a fuel truck accomplishes all boat fueling. All marinas within Area 10A currently have adequate closure zones. Table #7 is

included at the end of this report, providing additional detail on Area 10A boat docking facilities.

- D. Radionuclides** - Sources of radionuclides have not been identified within Area 10A, and radionuclide monitoring has not been conducted. No other sources of poisonous or deleterious substances have been identified within the area.

NONPOINT SOURCE POLLUTION

- A. Urban and Suburban Stormwater Runoff** – Past shoreline surveys conducted in Area 10A revealed numerous homes adjacent to shellfish growing areas. Single-family homes continue to be built sporadically along the mainland shores as well as on several marsh islands. Heavy development continues to occur around Folly Creek and Oak Island. Run-off from these locations has the potential to affect shellfish growing waters in the Folly River.

The Army Corps of Engineers has not conducted any dredging projects in Area 10A recently. The Folly River entrance occasionally requires maintenance dredging. The dredge material is usually either placed on the ocean side of the southernmost portion of Folly Island for beach renourishment or placed in an offshore spoil site. Morris Island is the only dredge spoil area within Area 10A. The Army Corps of Engineers reserves the right to use the spoil area at any time. The State Ports Authority (SPA) conducts maintenance dredging adjacent to their terminals (Area 10B). The Drum Island spoil area is the primary site used by the SPA in the Cooper River. The site is reaching its capacity and will soon be permanently closed. The SPA may then use Morris Island more frequently.

The uplands surrounding the shellfish growing waters of Area 10A consist of various soil textures defined by the United States Department of Agriculture (USDA), Soil Conservation Service (1971) utilizing general classifications and descriptions. Although lands within Area 10A consist of numerous soil types, the area is generally comprised of Wando-Seabrook soils and occur on flat ridges and lower lying bands. The USDA (1971) further describes these soils as "moderately well drained to excessively drained, nearly level to gently sloping, sandy soils."

- B. Agricultural Runoff** - There are no permitted agricultural facilities located in Area 10A. The lack of concentrated agricultural activity near the shoreline of the growing waters minimizes the potential for contamination of shellfish waters from agricultural runoff.
- C. Individual Sewage Treatment and Disposal Systems** - Homes adjacent to shellfish growing waters on James Island and Folly Island are primarily served by sanitary sewer, although some homes in the outlying areas, primarily on the northern end of Folly Island, are serviced by individual septic systems. Each system requires inspection by South Carolina Department of Health and Environmental Control's, Environmental Affairs, Bureau of Environmental Health Services Lowcountry – Charleston, On-site Wastewater Section and approval before final installation.

- D. Wildlife and Domestic Animals** - Area 10A supports a large population of domestic animals attributable to numerous private residences along the shores of both James Island and Folly Island. The area also supports a moderate amount of wildlife, primarily various types of marine birds and mammals. The entire growing area has an extensive network of small tidal creeks. This creek system provides a possible conduit for animal fecal coliform bacteria to be transported to adjacent growing waters.

Bird Key - Stono Heritage Preserve is a DNR managed heritage preserve, a sand spit island formed in the mouth of the Folly and Stono River. The preserve provides nesting, roosting and foraging habitat for a variety of sea and shore birds. Beginning in the mid-1980's, thousands of eastern brown pelicans, several species of terns, black skimmers, laughing gulls, two species of herons and other incidental species successfully nested on Bird Key Stono every year. Due to bird nesting activity, this Preserve is closed to public use from March 15 thru October 15 (Source: <http://www.dnr.sc.gov/managed/index.html>). Bird Key is a likely contributor to fecal coliform levels in the area during that time however those levels are likely mitigated by Bird Key's proximity to Stono Inlet and the immediate ocean water tidal flushing ocean inlets provide.

- E. Boat Traffic** - Recreational boat traffic is moderate in the area throughout the year. Commercial fisheries boats, ranging in size from 16 to 50 feet, operate throughout the area. There are heavy clam mariculture interests within this area. Folly River and Folly Creek are used on nearly a daily basis by these permit holders. During the recreational shrimp-baiting season, typically extending from mid-September through mid-November, recreational traffic is heavy.
- F. Hydrographic and Habitat Modification** - Hydrographic and habitat modification in estuarine areas requires both State and Federal approval. Portions of Folly River require maintenance dredging. The United States Army Corps of Engineers also utilize a designated tract of land adjacent to Lighthouse Creek on Morris Island as a dredge spoil site.

NATURALLY OCCURRING PATHOGENS

- A. Marine Biotoxins** - Bivalve shellfish contamination from marine biotoxins has not been shown to be a human health concern within Area 09A. During the winter and spring of 1988, South Carolina experienced an occurrence of "Red Tide", specifically *Ptychodiscus brevis* (*K. brevis*), which affected water quality in Area 01. There has been no documented reoccurrences of this organism at levels requiring emergency response in South Carolina waters subsequent to the 1988 event. Due to the vast media coverage of events related to *Pfiesteria piscicida*, the Department participates in a State Task Group on Toxic Algae and operates a toxic algae emergency response team.
- B. *Vibrio parahaemolyticus*** - Because State water temperatures exceed 81 degrees Fahrenheit (F) during June through September, *Vibrio parahaemolyticus* (Vp) management controls must be implemented during these months. Management controls for permitted Aquaculture facilities are specifically addressed in R.61-47. The season for

wild-stock harvest is currently closed from May 16 through September 30. The Department is currently opposed to issuance of special wild-stock harvest permits to Certified Shippers during the closed season. Special permit conditions for maricultured triploid oysters during the vibrio control months must include current R.61-47 and NSSP temperature control requirements to be included in the Certified Shipper's HACCP plan.

HYDROGRAPHIC AND METEOROLOGICAL CHARACTERISTICS

PHYSIOGRAPHY

Area 10A consists of the waters of the Folly River system and the Clark Sound basin. Connections with the Atlantic Ocean are via Charleston Harbor, Lighthouse Inlet and Stono Inlet. Influence of high salinity ocean water entering the area by way of these inlets provide high flow and a subsequent flushing action which assists in maintaining high water quality. The creeks within the area range from 30 to 500 feet in width and average 3 to 25 feet in depth. The entire area is approximately four miles wide (northwest to southeast) and eleven miles long (southwest to northeast).

Tides in Area 10A are semidiurnal, consisting of two low and two high tides occurring each lunar day. Mean tidal ranges in Folly Creek, at the Folly Road Bridge, are 5.5 feet during normal tides and 7.1 feet during spring tides. Wind direction and intensity, as well as atmospheric pressure, typically cause variations in predicted tidal ranges.

Precipitation in Area 10A is heaviest during late summer and early autumn. Tropical storms and hurricanes occasionally produce extremely large amounts of rainfall. During winter months heavy rainfall events are uncommon, yet occasional intense thunderstorms associated with rapidly moving low-pressure systems generate heavy rains. Precipitation rarely occurs in the form of snow or ice. Spring weather patterns may be dynamic with associated thunderstorms and severe weather conditions.

In 2017, the collection of rainfall data has been improved for a more consistent, accurate, and reliable data set that can be accessed directly from a shellfish staff member's computer or phone. With assistance from the National Weather Service's, Southeastern River Forecast Center, the development of the South Carolina Shellfish Rainfall Program was introduced and utilized. This new technology provides shellfish program staff with real-time daily updates for rainfall accumulation in each of the South Carolina shellfish growing management areas, as well as providing critical triggers that alert staff to when rainfall thresholds for closures are exceeded.

In September of 2019, Hurricane Dorian produced 6.92 inches of rainfall during a two-day period. On October 8, 2016, Hurricane Matthew made landfall southeast of McClellanville, SC. Shellfish harvest was closed by SC DHEC prior to the arrival of the storm. Hurricane Matthew dropped considerable amounts of precipitation in the Charleston area and had a storm surge that caused extensive flooding. SC DHEC reassessed the closures after the storm and conducted sampling prior to reopening the growing areas. Water sampling was used to reopen the beds once fecal coliform concentration levels were low enough to permit harvest. The widespread flooding also caused sanitary sewer overflows into harvestable shellfish areas, requiring 21-day closures

and additional tissue samples prior to reopening. On September 12, 2017, Hurricane Irma passed over Charleston, SC causing significant flooding with 6.34 inches of rain in Area 10A and a 9.9 foot high tide in Charleston. The 2019 precipitation total recorded for Area 10A was 47.47 inches.

Prevailing winds along the central portion of the South Carolina coast are from the south and west during spring and summer and from the north during autumn and winter. Wind speeds are generally less than 15 miles per hour (mph); however, strong weather systems may generate winds in excess of 25 mph. Tropical storms and hurricanes occur occasionally.

Freshwater rivers do not discharge directly into Area 10A. Freshwater influence is primarily due to rainfall.

WATER QUALITY STUDIES

DESCRIPTION OF THE PROGRAM

The Department currently utilizes a systematic random sampling (SRS) strategy within Area 10A in lieu of sampling under adverse pollution conditions. In order to comply with NSSP guidelines, a minimum of thirty samples are required to be collected and analyzed from each station during the review period. Sampling dates are computer generated prior to the beginning of each quarterly period thereby insuring random selection with respect to tidal stage and weather. Day of week selection criteria is limited to Mondays, Tuesdays and Wednesdays due to shipping requirements and laboratory manpower constraints. Sample schedules are rarely altered.

During July 1998, an updated shellfish water quality data scheduling and collection procedure was formalized. Samples utilized for classification purposes are limited to those samples collected in accordance with the SRS for a 36-month period beginning January 1 and ending December 31. This allows for a maximum of 36 samples per station, yet provides a six-sample “cushion” (above the NSSP required 30 minimum) for broken sample bottles, lab error, breakdowns, etc. This also allows each annual report’s water quality data to meet the requirements for the NSSP Triennial Review sampling criteria.

Nine hundred and fifty-two (952) routine SRS surface water quality samples (<1.0 ft deep) were collected for bacteriological analyses and classification purposes from twenty-eight (28) active water quality sampling stations in Area 10A during the period 01/01/17 through 12/31/19. Twenty (20) special samples were also taken for non-classification purposes, associated with reopening after precautionary closures. Samples were collected in 120 ml amber glass bottles, immediately placed on ice and transported to the South Carolina Department of Health and Environmental Control’s, Environmental Affairs, Lowcountry – Charleston Laboratory in North Charleston, South Carolina. An additional 120 ml water sample was included with each shipment as a temperature control. At the laboratory, sample sets exceeding a 30-hour holding time or containing a temperature control in excess of 10 degrees C. were discarded (APHA, 1970).

Surface water temperatures are measured utilizing hand-held, laboratory-quality calibrated centigrade thermometers. Salinity measurements are obtained in the laboratory using an automatic temperature compensated refractometer. Additional field data include ambient air

temperature, wind direction, tidal stage and date and time of sampling.

MONITORING RESULTS

No Station exceeds a fecal coliform geometric mean MPN value of 14. Station 10A-16B exceeded a fecal coliform MPN estimated ninetieth percentile value of 43.

No station exceeded a geometric mean MPN value of 88 and no stations exceeded a fecal coliform MPN estimated 90th percentile value of 260.

The 2017 Shellfish season was delayed until October 15, 2017 due to a precautionary closure brought on by Hurricane Irma.

The Charleston Harbor south to the North Edisto River including all areas of Area 12B closed on 2/27/2018 and reopened on 3/20/2018 due to a force main break in the Town of Hollywood's sewer line.

CONCLUSIONS

Based on the review of the fecal coliform bacteriological data and the pollution source survey for the upcoming 2020-2021 shellfish harvesting season, Area10A is primarily impacted by two sources of actual or potential pollution.

POTENTIAL POINT SOURCE IMPACTS

Available hydrographic information suggests the potential of an impact from pollution sources located outside the growing area. The portion of the area from the Charleston Harbor extending southwest to Schooner Creek appears to be adversely impacted during certain hydrographic conditions by waters originating in the Charleston Harbor (Moore, 1984). Outfalls from wastewater treatment plants discharging into the harbor are subsequently discharging into northeastern portions of Area 10A. Flow calculations have established time and distance of travel and place the effluent plumes within Schooner Bay near Fort Sumter. Due to public health concerns, waters from the confluence of Schooner Creek and Schooner Bay and all associated creeks and marshland to the Charleston Harbor will remain Administratively Prohibited.

NONPOINT SOURCE RUNOFF

Nearly all of Area 10A's upland shoreline has residential development bordering the marsh. Impervious surfaces typically result in increased volumes of stormwater runoff and a more rapid movement of stormwater into adjacent shellfish harvesting waters. Increases in rainfall typically result in increased stormwater runoff, which often results in elevated fecal coliform levels. These factors increase the potential for water quality to be adversely impacted within the immediate area.

The majority of stations within Area 10A meet the statistical criteria for an Approved classification. Stormwater runoff continues to be the major source of minimal fecal coliform contamination throughout the area. The moderate populations of domestic and wild animals likely impact water quality in the area. Over land runoff in Area 10A appears to be mitigated by

ocean water flushing through Charleston Harbor, Lighthouse Inlet and Stono Inlet.

RECOMMENDATIONS

There will be one recommended classification change for the 2020-2021 shellfish harvesting season within Area 10A. Station 10A-16B now meets the criteria for a Restricted Classification. SFMA 10A is now recommended for the follow classifications for the upcoming season:

PROHIBITED

1. Those waters and adjacent marshland between 10A-18 from Schooner Creek to the Charleston Harbor;
2. Those waters and adjacent marshland from Bass Creek to the Charleston Harbor;
3. Those waters and adjacent marshland within Parrot Point Creek from Lighthouse Rd down to Schooner Creek and across to the Charleston Harbor;
4. Those waters within 1,000 feet of the old Backman's Commercial Fisheries Dock;
5. Those waters within 1,000 feet of Sunset Cay Marina;
6. Those waters within 1,210 feet of Mariner's Cay Marina;
7. Those waters within 350 feet of Crosby's Commercial Fisheries Dock.

RESTRICTED

1. Those waters and adjacent marshland from Holland Island Creek to Folly Rd (171).
2. The waters of Clark Sound west of Stations 10A-16 and 10A-34A, including Station 10A-16B to the mainland.

CONDITIONALLY APPROVED

None

APPROVED

1. Schooner Creek to a line drawn between 10A-35, 10A-33, and 10A-34A;
2. All other waters in Area 10A.

Station Additions/Deactivations/Modifications: None

Analysis of sampling data for Area 10A demonstrates the probability of a significant impact from rainfall exceeding 4.00" in a 24-hour period. Therefore, a precautionary closure of Area 10A will be implemented following rainfall events of greater than 4.00" in a 24-hour period, as measured by the National Weather Service, Southeastern River Forecast Center. This methodology is associated with the concept of the Probable Maximum Precipitation (PMP). PMP estimates for the coastal United States have been published in a series of hydro-meteorological reports (HMRs) by the National Weather Service (*National Weather Service*). PMP estimates for South Carolina's growing areas are derived from HMRs 51, 52, and 53 (*National Research Council, 1985*).

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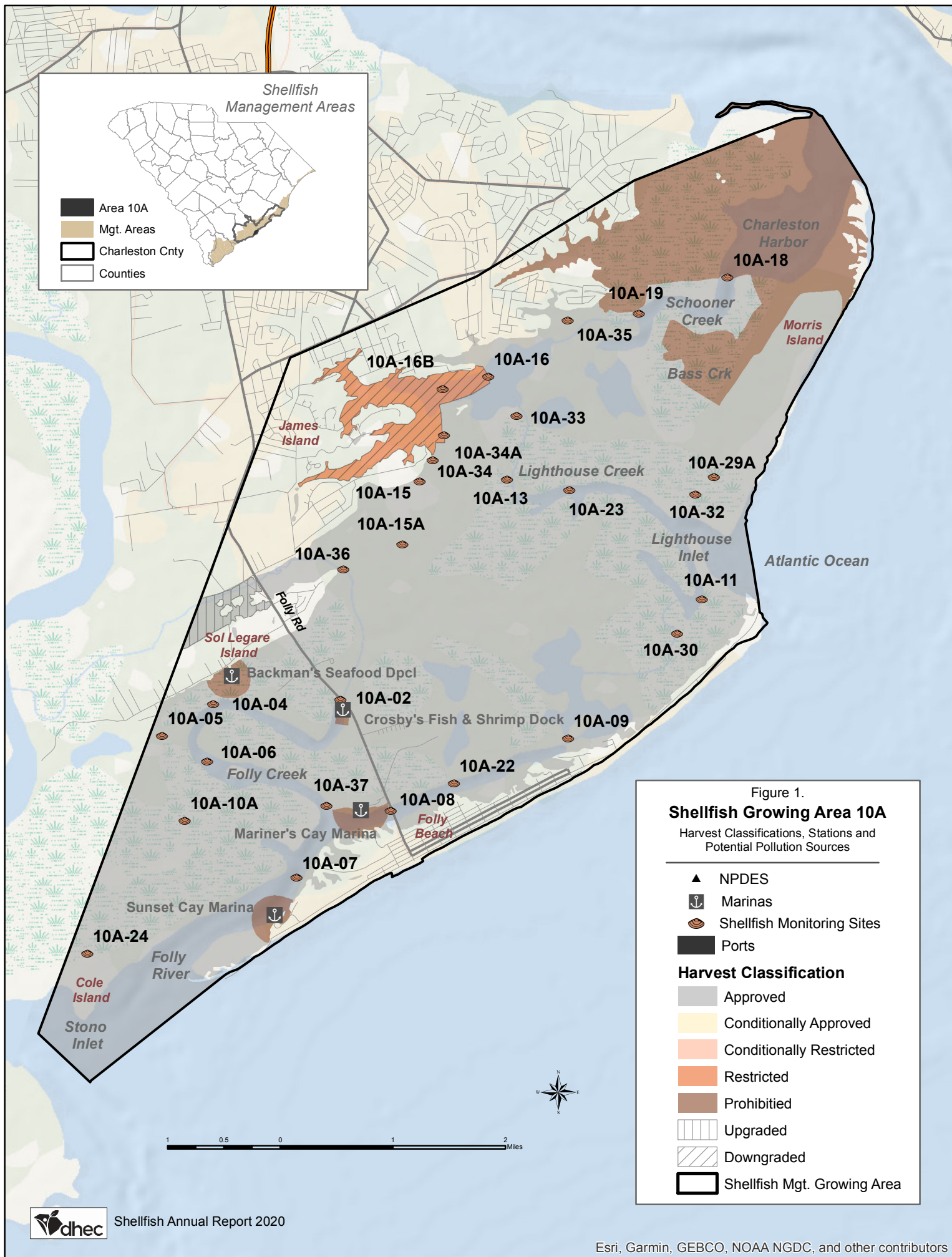


TABLE #1
Shellfish Management Area 10A
Water Quality Sampling Stations Description

Station	Description
10A-02	Folly Creek at SC Hwy 171 Bridge
10A-04	Folly Creek at Backman Creek
10A-05	King Flats Creek
10A-06	Folly Creek at northern end of Little Island
10A-07	Folly Creek north of old Folly Marina
10A-08	Folly River at SC Hwy 171 Bridge
10A-09	Folly River at last dock north
10A-10A	Robbins Creek at the first bend upstream from Cutoff Reach
10A-11	Rat Island Creek at first creek on left from Lighthouse Creek
10A-13	Lighthouse Creek at Folly Creek
10A-15	Secessionville Creek at private docks
10A-15A	Folly Creek at Secessionville Creek
10A-16	Clark Sound at Ocean View Flats
10A-16B.....	Clark Sound, 550 yds East of Station 10A-16A
10A-18	Schooner Creek at Schooner Bay
10A-19	Schooner Creek at fork
10A-22	Folly River State Shellfish Ground at Folly Island
10A-23	Lighthouse Creek at First Sister Creek
10A-24	Cole Creek - second bend
10A-29A	Block Island Creek at Flats
10A-30	Rat Island Creek - second bend
10A-32	Block Island Creek at fork
10A-33	Lighthouse Creek at Clark Sound
10A-34	Secessionville Creek at First Dock nearest Clark Sound
10A-34A	Lighthouse Creek at Secessionville Creek and Clark Sound
10A-35	Right Fork of Schooner Creek, middle of docks
10A-36	Unnamed Creek at Fork near RiverFront Subdivision
10A-37	Folly Creek at Oak Island Creek

(Total Active – 28)

TABLE #2

**Shellfish Management Area 10A
Fecal Coliform Bacteriological Data Summary
From Shellfish Water Quality Sampling Stations Between**

January 1, 2017 and December 31, 2019

Station #	2	4	5	6	7	8	9	10A	11	13
SAMPLES	34	34	34	34	34	34	34	34	34	34
GEOMEAN	2.8	2.3	3.1	2.9	3	3.1	3	2.8	2	2.6
90TH %ILE	7	5	7	9	9	9	9	7	3	5
WATER QLTY	A	A	A	A	A	A	A	A	A	A
CLASSIFICATION	P	A	A	A	A	P	A	A	A	A

Station #	15	15A	16	16B	18	19	22	23	24	29A
SAMPLES	34	34	34	34	34	34	34	34	33	34
GEOMEAN	5	2.4	5.6	8.8	3.1	4.5	3.3	2.2	3.5	3.6
90TH %ILE	21	5	27	67	8	15	9	4	14	14
WATER QLTY	A	A	A	R	A	A	A	A	A	A
CLASSIFICATION	A	A	R	R	P	P	A	A	A	A

Station #	30	32	33	34	34A	35	36	37
SAMPLES	34	34	34	34	34	34	34	34
GEOMEAN	2.4	2.8	3.1	5.9	5.2	4.5	4.3	2.8
90TH %ILE	5	9	8	27	27	19	17	7
WATER QLTY	A	A	A	A	A	A	A	A
CLASSIFICATION	A	A	A	A	R	A	A	A

A - Approved **CA** - Conditionally Approved **R** - Restricted
RND - Restricted/No Depuration **P** - Prohibited

Table #3
Fecal Coliform Historical Trend Sheet

Area 10A Stations 90thile Values for Annual Updates Related to Rainfall

Station #	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
10A-02	7	7	8	12	10	11	6	6	6	8	9
10A-04	5	7	8	10	10	10	6	6	6	7	8
10A-05	7	6	6	7	7	6	4	6	7	10	7
10A-06	9	10	8	10	9	9	7	6	8	7	8
10A-07	9	10	9	7	7	8	7	5	6	9	11
10A-08	9	8	9	9	9	12	9	11	22	38	36
10A-09	9	8	8	6	6	7	7	9	15	14	15
10A-10A	7	8	9	10	9	8	5	5	6	7	6
10A-11	3	4	5	7	7	8	6	6	6	7	7
10A-13	5	5	4	5	6	6	6	6	9	10	13
10A-15	21	27	30	40	31	26	13	11	13	16	20
10A-15A	5	6	8	9	7	6	5	5	6	6	8
10A-16	27	21	26	50	46	35	15	12	16	18	21
10A-16B	67	43	27	39	36	39	24	24	45	69	233
10A-18	8	11	12	16	15	13	7	7	8	8	8
10A-19	15	12	14	15	17	11	10	7	9	9	13
10A-22	9	9	8	6	6	7	6	9	15	15	14
10A-23	4	4	4	5	5	4	4	5	8	7	8
10A-24	14	14	8	11	10	9	4	4	8	8	7
10A-29A	14	15	12	19	23	26	19	14	20	27	42
10A-30	5	5	5	7	8	8	6	5	9	9	8
10A-32	9	12	13	11	11	12	10	12	15	19	18
10A-33	8	8	7	9	9	9	8	8	9	14	11
10A-34	27	24	22	30	25	27	19	16	19	23	26
10A-34A	27	32	32	32	31	34	26	12	22	37	223
10A-35	19	22	25	31	34	34	21	12	24	31	32
10A-36	17	21	15	23	16	23	15	13	22	35	211
10A-37	7	10	11	13	11	10	7	5	10	15	57
Annual Rainfall (in inches)	47.47	55.25	60.24	45.49	64.58	56.8	27.9	37.4	50.9	60.7	47.9

ND = No Data Red = Impaired Water Quality

TABLE #4

WATER QUALITY SAMPLING STATIONS DATA

Shellfish Management Area 10A

Detailed data for each shellfish monitoring station listed in this report's "Fecal Coliform Bacteriological Data Summary Table" and in other shellfish reports, can be obtained by writing South Carolina's Department of Health and Environmental Control – Freedom of Information Office at the address below.

Freedom of Information
SC Dept. of Health & Environmental Control
2600 Bull Street
Columbia, SC 29201

Any explanation or clarity needed on the report's content can be obtained by contacting the preparer(s), and/or reviewer(s) listed on the cover page.

TABLE #5

RAINFALL DATA

Shellfish Management Area 10A

Source:

2017 – 2019 Data

National Weather Service - Southeastern River Forecast Center

Location: Folly Beach, South Carolina

2017 Annual Rainfall Summary
Source: National Weather Service - Southeastern River Forecast Center
Location: Folly Island, South Carolina

2017	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	0.28						0.98		0.15			
2	0.01		0.08		0.52	0.08			1.5			
3	0.1		0.07			0.05	0.1	1.34	0.03	0.05		
4	0.08	0.01		0.55			0.19	0.29		0.04		
5					0.34	0.04		1.32				
6				1.67	0.07	0.99		0.27	1.25			
7	0.49					1.62			0.07	0.1		0.28
8		0.19				1.34	0.48	0.59		0.07		0.63
9		0.06				0.02	0.25	0.81		0.02	0.03	0.59
10							0.53	1.21	0.06	0.05	0.44	
11							0.05	0.31	0.58			
12		ND	0.02					ND	6.34	0.01		
13					0.04			0.14				
14			0.45		0.78	0.01						
15								0.23	0.31			
16		0.26					0.04	ND				
17							1.93	ND		0.13		
18							0.5	ND				
19						0.03	0.01	ND				
20				0.05		0.02	0.54	ND				
21						0.57	0.01	0.04				0.21
22	1.53	0.03	0.31		0.19	0.68		ND			0.18	
23	1.37				1.68				0.02	1.29		
24	0.08			1.88	2.56		0.02	0.38		1.01	0.42	
25				1.45	0.18	0.61	1.32	1.14				0.04
26						0.33	0.09	0.06				
27							0.3	0.04				0.05
28		0.05						0.15				0.04
29			0.03				0.25	2.03		0.12		0.1
30						0.07	1.98					0.01
31			0.18									
Total	3.94	0.6	1.14	5.6	6.36	6.46	9.57	10.35	10.31	2.89	1.07	1.95
*Days highlighted indicate 4 or more inches of rain in a 24 hour period. Blank fields indicate no rainfall.												
* Sample dates are indicated in blue.						ND = No Data			ANNUAL RAINFALL		60.24	

2018 Annual Rainfall Summary
Source: National Weather Service - Southeastern River Forecast Center
Location: Folly Island, South Carolina

2018	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1			0.01			0.10	0.23	0.33	0.04			
2			0.05					0.20			0.08	1.14
3						0.35		0.49			0.01	2.01
4	1.17						1.24	0.63				
5		0.46		0.01			0.44	0.30			0.98	
6								0.03			0.23	
7			0.12				0.07				0.04	
8		0.23		0.51		0.01	1.27		0.22	0.22	0.26	
9				0.01		1.86		0.04	0.15	0.31	0.02	1.19
10		0.37		0.04		0.12		0.48		0.92	0.50	0.62
11				0.13		0.60		0.02	0.16	0.25		
12	0.02	0.03	0.20			0.01		0.23		0.02		
13	0.21	0.11	0.27			0.23	0.15	0.01	0.04		0.99	
14							0.02	0.06			0.06	1.46
15				0.01	0.01	0.03		0.55	0.24		1.20	2.68
16				0.71	0.06	0.06			0.04			0.08
17					0.49		0.29					
18			0.05		0.15		0.68		0.15			
19			0.24		1.15		0.86	0.19	0.06		0.08	
20			0.32		0.11		1.25	0.03				0.33
21			0.35		0.02	0.02	0.91			0.16		0.53
22												
23	0.25			0.22			0.05					
24		0.01		2.11	0.12		1.23				0.43	
25			0.03		0.10	0.68	0.15				0.05	
26		0.14				0.07	0.43			0.10		
27							0.21	0.07		0.19	0.10	
28	0.01				2.28	0.02	0.64	0.30	0.43			0.26
29	0.79				0.18		0.20	0.02	0.27			0.27
30					0.67	0.08	1.69		0.18			
31			0.21				0.53					
Total	2.45	1.35	1.85	3.75	5.34	4.24	12.54	3.98	1.98	2.17	5.03	10.57
*Days highlighted indicate 4 or more inches of rain in a 24 hour period. Blank fields indicate no rainfall.												
* Sample dates are indicated in blue.						ND = No Data			ANNUAL RAINFALL		55.25	

2019 Annual Rainfall Summary
Source: National Weather Service - Southeastern River Forecast Center
Location: Folly Island, South Carolina

2019	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1			0.02			0.01			1.33		0.18	
2			0.04	0.29			0.05					0.07
3			0.01	0.24			0.04	0.58	0.17			
4	0.02	0.07	0.38		0.01		0.05	0.09				
5	0.32		0.20	0.06	0.03	0.37	0.13	0.28	*5.05	0.04		
6			0.03	0.58		0.21	0.68	0.06	*1.87	0.06	0.19	
7				0.15		1.43	0.06			0.09		0.06
8				0.24		0.30	0.02			0.66	0.21	
9				0.04	0.02	0.55		0.03			0.01	
10				0.50	0.02	0.22	0.14					
11						0.03	0.74	0.05				
12		0.17	0.09	0.17		1.00	0.01	0.04				
13		0.07		0.06	0.30	1.45					0.24	
14	0.09				0.04		0.02	0.04		0.12		2.23
15								1.50			0.47	0.02
16		0.12	0.01				0.07	0.03		2.07	0.36	
17		0.04	0.02		0.01			0.59		0.01	0.57	
18	0.05						0.01	1.34	0.01			0.24
19	0.01	0.01		0.24			0.70	0.06		0.01		
20	0.64			0.61		0.04				1.27		
21		0.20				0.32						
22						0.06				0.03		
23						0.66						2.83
24	0.43						0.96				0.10	2.63
25	0.11	0.07						0.41				
26			0.03									
27										0.12		
28		0.01								0.10		
29								0.54				
30	0.04					0.06				0.12		0.97
31								0.02				
Total	1.71	0.76	0.83	3.18	0.43	6.71	3.68	5.66	8.43	4.70	2.33	9.05
*Days highlighted indicate 4 or more inches of rain in a 24 hour period. Blank fields indicate no rainfall.												
* Sample dates are indicated in blue.						ND = No Data			ANNUAL RAINFALL		47.47	

TABLE #6
Shellfish Management Area 10A
Pollution Event Closures
2017 – 2019

Event	Date(s)	Sample Date(s)	Opening Date	Comments
Hurricane Irma	09/12/2017	09/18/2017	10/15/2017	The 2017 shellfish season was delayed two weeks due to water quality impacts from Hurricane Irma.
SSO (Town of Hollywood)	02/19/2018	03/28/2018	03/20/2018	21-Day Precautionary Closure
Hurricane Dorian	09/05/2019- 09/06/2019	N/A	N/A	6.92 inches of rain produced during a 2-day period. Open Shellfish Harvesting Season was closed. No summer harvest in Area 10A during this time.

TABLE #7
Shellfish Management Area 10A
MARINA INVENTORY

Marina	Total Slips	Pump-out Facility	Fuel Dock
Sunset Cay	118	Yes	No
Mariners Cay	89	Yes	Diesel-Gas
Crosby's Fish & Shrimp Co.	7	No	Fuel Truck
Backman's Seafood	3	No	Diesel